APPLICATION OF LARGE-SCALE ANALYSIS TECHNIQUES TO A MAN-PORTABLE LIMITED-SCOPE ENVIRONMENT

Keith S. Pickens
Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78228-0510

INTRODUCTION

New computer-assisted ultrasonic inspection techniques are occurring on both small PC-based and larger minicomputer/workstation-based systems. The bigger systems can address large-scale inspection problems through the acquisition of multigigabytes of data and the use of sophisticated analysis and visualization techniques [1,2]. With these benefits, however, come greater bulk, complexity, and cost. Smaller systems excel in applications requiring man portability. Optimally a combination of the two technologies would provide the sophisticated analysis techniques of the large systems with the smaller size and lower cost PC. The EDAS Model 100 ultrasonic inspection system, described in this paper, achieves this synthesis.

DESIGN GOALS

The goals of the EDAS Model 100 developmental effort were four fold. First was the primary requirement to retain "big system" analysis capabilities allowing increased quality and productivity. Second was to reduce system size by a factor of three. With proper packaging this reduction would allow the third goal of man portability to be achieved. Finally, the system cost was to be reduced.

DISTINGUISHING CHARACTERISTICS

To meet the design goals, the characteristics that distinguish the PC systems were examined, and a number of distinct differences were identified. The amount of data generated is much less; i.e., typical data sets are under 1 Gbyte versus the more than 10 Gbytes on the large-scale systems. The smaller systems require only two channels compared to the four or more channels on the big systems. The fewer channels reduce the data rates, and generally smaller low-speed scanners are used. Lastly, the inspection environment is less constrained by requirements that restrict inspection and analysis times.

DESIGN FEATURES

To maintain compatibility and achieve maximum possible leverage from evolving computer technology, a desktop workstation was chosen for the

Review of Progress in Quantitative Nondestructive Evaluation, Vol. 10B
Edited by D.O. Thompson and D.E. Chimenti, Plenum Press, New York, 1991

Model 100 acquisition/ analysis computer. This machine supports the same sophisticated analysis software used on large EDAS-class systems. The two input channels used a multiprocessor configuration similar to previous systems [3]. To reduce size and weight, however, 3-view generation was performed in software. This was made possible by the speed of the acquisition workstation and the limited data rates found in the targeted applications. The system was reconfigured to make optical-disk data storage an option. (Some applications do not generate data sets large enough to warrant the added expense of optical-disk storage.)

Man portability was achieved by packaging the Model 100 so that it could be broken down for transportation. The selected packaging supported rapid and simple setup and teardown. Figure 1 shows the Model 100 packaging scheme. As with the large EDAS systems, the smaller configuration was not restricted to a single technique or scanner. The software supported multiple techniques, and the position-sensing processor could be interfaced to many different scanners.

CONCLUSION

Through a systematic design approach and maximum use of advanced computer technology, a powerful ultrasonic inspection system was developed. Incorporating the analysis capabilities of a large-scale system and man portability, the EDAS Model 100 represents an extension of the state-of-the-art in small systems.

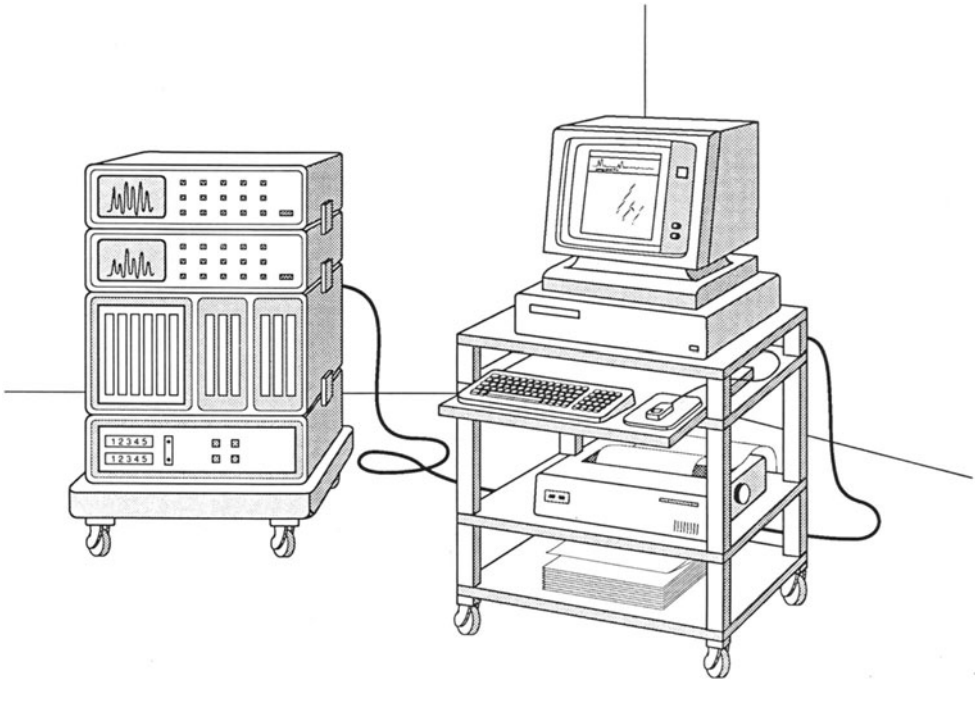

Fig. 1. The EDAS Model 100 uses a stacking modular packaging scheme. This allows the system to be shipped by air and setup at an inspection site without special handling equipment.

REFERENCES

1. Keith S. Pickens, Joseph A. Shoemaker, Dennis R. Hamlin, Ron H. Peterson, and Harry L. Grothues, in Review of Progress in Quantitative NDE, edited by D. O. Thompson and D. E. Chimenti (Plenum Press, New York, 1987).
2. Keith S. Pickens, Joseph A. Shoemaker, Dennis R. Hamlin, Harry L. Grothues, and Ron H. Peterson, Ultrasonics International '89 Conference Proceedings (Cambridge University Press, Cambridge, England, 1989).
3. Harry L. Grothues, Ron H.Peterson, Dennis R. Hamlin, and Keith S. Pickens, in Review of Progress in Quantitative NDE, edited by D. O. Thompson and D. E. Chimenti (Plenum Press, New York, 1986).